

In the Claims

1. (First Amended) A cation-exchanged intercalate that is essentially free of non ion-exchanged intercalated cation and is prepared without washing away excess organic cations and by contacting a layered clay material with cations in an amount no more than an excess of 5 wt. % of the layered claim material comprising :

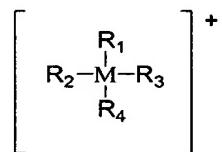
a layered clay material that has essentially all of its exchangeable cations exchanged with one or more organic cations and contains extractable salts of organic cations in an amount no more than 5 weight % of the layered clay material after ion-exchange and is substantially free of organic cations that are not ionically bonded to a layered clay platelet.

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2. (original) The intercalate of claim 1, wherein the cation-exchanged organic cations comprise at least 99.5% of the cation exchange capacity of the layered clay material.

3. (original) The intercalate of claim 1, wherein the extractable salts of the organic cations comprise no more than 0.5 molar percent of the cation exchange capacity of the layered clay material.

4. (original) The intercalate of claim 1, wherein the organic cation is an onium salt.

5. (original) The intercalate of claim 1, wherein the organic cation has the formula



wherein M is either nitrogen or phosphorous, and R1, R2, R3, and R4 are independently organic and/or oligomeric ligands or may be hydrogen.

6. (original) The intercalate of claim 5, wherein the organic cation is an ammonium salt.

7. (First Amended) The intercalate of claim 1, wherein the cation-exchanged layered clay material is intercalated with an intercalant oligomer or polymer selected from the group consisting of a polyester, polyetherester, polyamide, polyesteramide, polyurethane, polyimide, polyetherimide, polyurea, polyamideimide, polyphenyleneoxide, phenoxy resin, epoxy resin, polyolefin, polyacrylate, polystyrene, polyethylene-co-vinyl alcohol, ~~or~~ a copolymer thereof, ~~or~~ and a mixture thereof.

8. (original) The intercalate of claim 7, wherein polymer intercalant comprises a partially aromatic polyamide, aliphatic polyamide, wholly aromatic polyamide or a mixture thereof.

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9. (original) The intercalate of claim 7, wherein the polymer intercalant comprises poly(m-xylylene adipamide) or a copolymer thereof, isophthalic acid-modified poly(m-xylylene adipamide), nylon-6, nylon-6,6, or a copolymer thereof, EVOH or a mixture thereof.

10. (original) The intercalate of claim 1, wherein the layered clay material comprises montmorillonite, hectorite, mica, vermiculite, bentonite, nontronite, beidellite, volkonskoite, saponite, magadite, kenyaite, or a mixture thereof.

11. (original) The intercalate of claim 1, wherein the layered clay material comprises sodium montmorillonite or sodium bentonite.

12. (first amended) An exfoliate made by delaminating the intercalate of claim 1 such that at least ~~about~~ 50 percent of the layered clay material is dispersed in the form of individual platelet particles and tactoids in a carrier and the individual platelet particles have a thickness of less than ~~about~~ 2 nm and a diameter of from about 10 to about 3000 nm.

13. (first amended) A process for preparing a cation-exchanged intercalate having a decreased level of extractable cations comprising the step of:

contacting a layered clay material with an organic cation after analysis of the clay material to determine in an amount of said organic cation within the range of 0.95 and 1.05 moles of organic cation for each mole of exchangeable cations in the layered clay material.

14. (original) The process of claim 13, further including the step of intercalating the cation-exchanged layered clay material with an oligomer or polymer intercalant.

15. (original) The process of claim 14, wherein the oligomer or polymer intercalant is intercalated into the layered clay material in a batch mixing or a melt compounding extrusion process.

16. (cancelled)

17. (first amended) The process of claim 14 further including the step of shearing the intercalate in a suitable carrier to delaminate the intercalate such that at least ~~about~~ 50 percent of the layered clay material is dispersed in the form of individual platelet particles and tactoids and the individual platelet particles have a thickness of less than ~~about~~ 2 nm and a diameter of from about 10 to about 3000 nm.

18. (first amended) The process of claim 13 wherein the moles of exchangeable cations in the layered clay is determined empirically in order to approximate an equimolar quantity of organic cation to intercalate into the clay by titrating the clay with an organic cationic indicator that cation-exchanges with the exchangeable cations in the clay and provides an indication when all exchangeable cations have been ion-exchanged with cations from the indicator.

19. (original) The process of claim 18, further including the step of extracting any excess cations from the organic cation-contacted layered material to determine by trial and error if an amount of organic cations intercalated into the layered clay material

should be raised or lowered from the approximate cation amount determined by titration.

20. (new) The process of claim 19, further including the steps of incrementally raising or lowering the amount of organic cations intercalated into the layered clay material and analyzing the layered clay material for excess cations until the amount of cations added to the layered clay material for intercalation is in the range of 0.95 to 1.05 moles of organic cation for each mole of exchangeable cations in the layered clay material.

21. (new) A process for preparing a cation-exchanged intercalate having a decreased level of extractable cations comprising the step of:

analyzing the organic cation intercalated clay for extractable organic cations % determine an amount of organic cations sufficient to provide 0.95 to 1.05 moles of organic cations for each mole of exchangeable cations in the layered clay material; and

contacting the layered clay material with said organic cations.

22. (new) The product made by the process of claim 13.

23. (new) The product made by the process of claim 14.

24. (new) The product made by the process of claim 15.

25. (new) The product made by the process of claim 16.

26. (new) The product made by the process of claim 17.

27. (new) The product made by the process of claim 18.

28. (new) The product made by the process of claim 19.

29. (new) The product made by the process of claim 20.

30. (new) The product made by the process of claim 21.